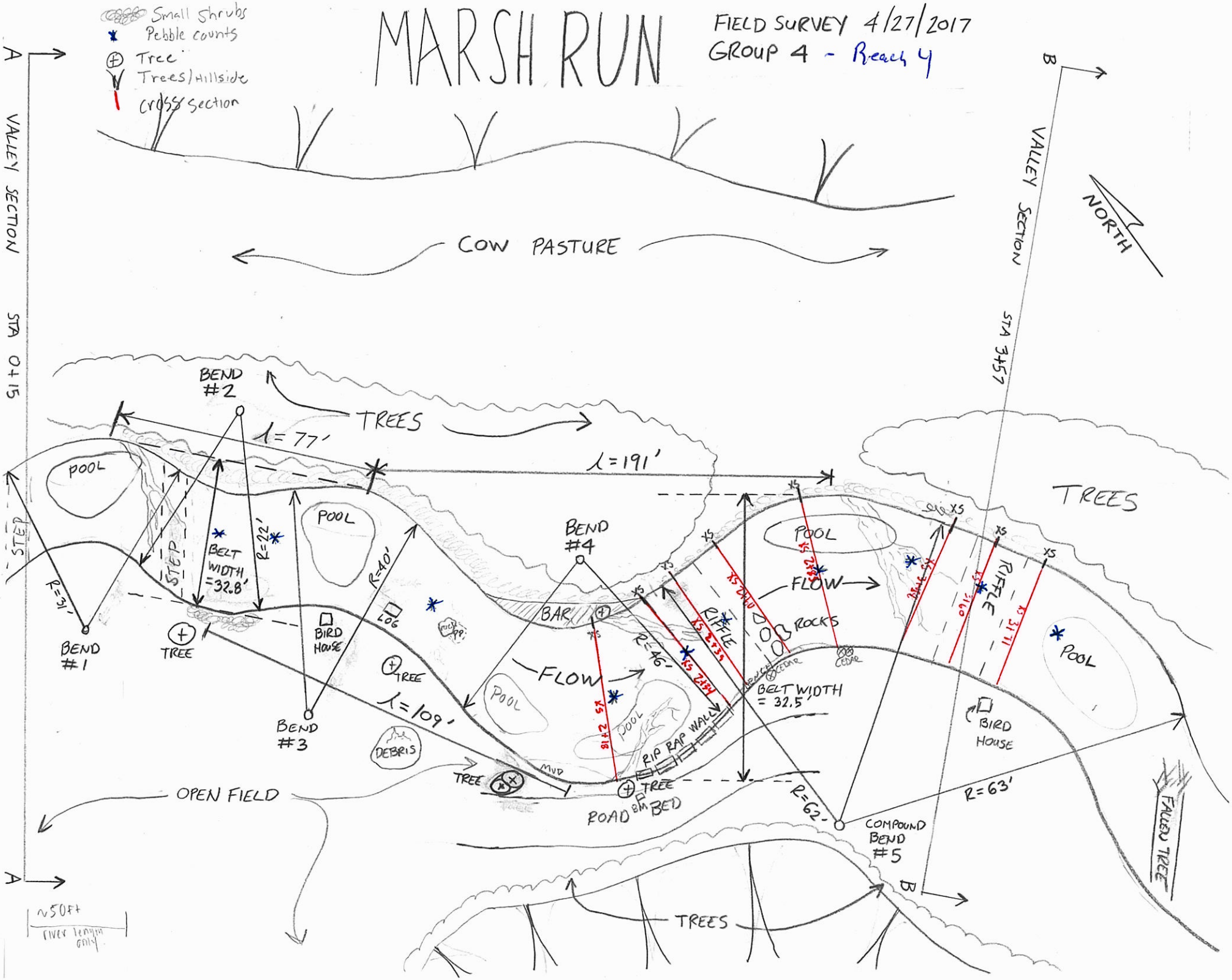
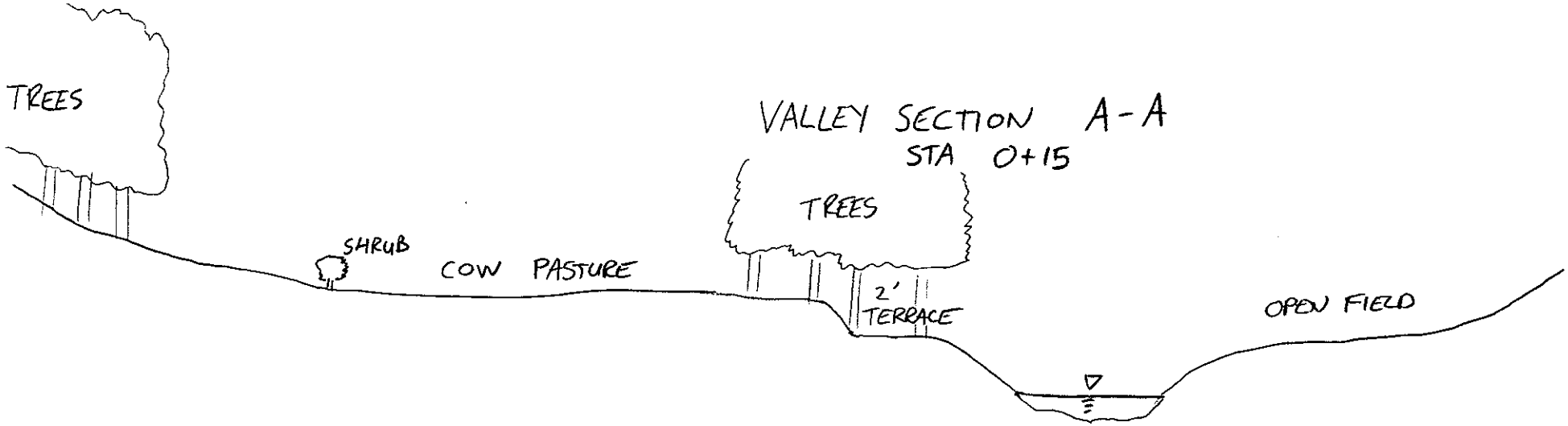
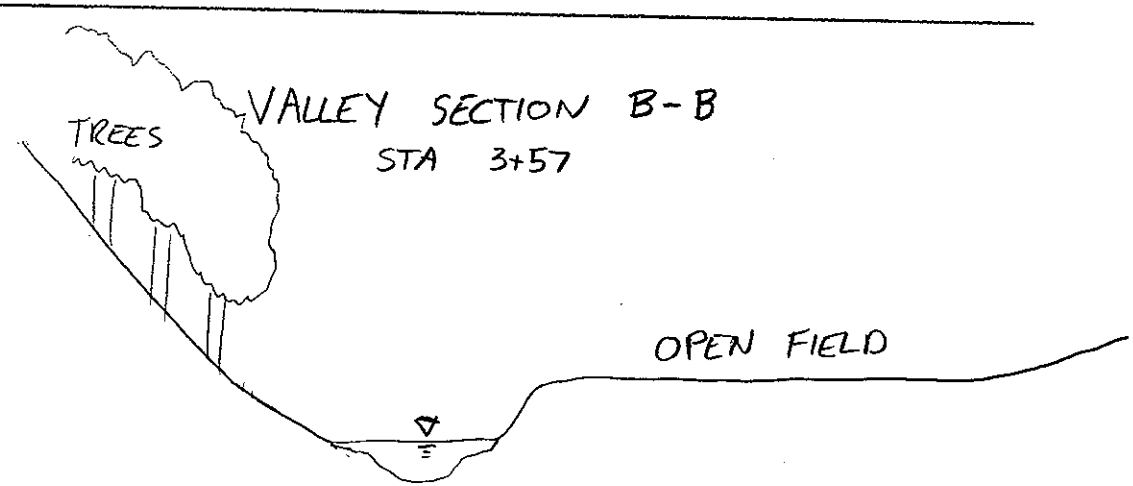
MARSH RUN

FIELD SURVEY 4/27/2017
GROUP 4 - Reach 4







MARSH RUN

FIELD SURVEY 4/27/2017
GROUP 4

VALLEY CROSS-SECTIONS

Reach 4

Pool (2185) BS 5.08

Marsh Run
Reach 4
4/27/17

BS=	(BM1)	
0+00	5.4	
4.4	5.1	
7.1	4.76	
8.6	4.78	LTOB
9.9	5.4	
10.9	6.43	
11.4	6.93	BKF ?
12.2	7.32	BKF ?
12.8	7.89	
13.3	8.03	
13.6	8.14	LEOW
14.2	8.45	
15.7	9.11	IB
17.8	9.62	
19.9	9.84	
21.1	10.09	
22.6	9.84	
24.9	9.67	
26.9	9.33	
27.4	9.18	
28.7	8.48	
29.2	8.39	
29.3	8.14	REW
29.6	7.76	
31.1	7.09	BKF?
31.7	6.82	BKF
32.7	6.05	
33.7	5.74	
36	5.23	

41 4.81 RTOB
43 4.87

SURVEY DATA → **CROSS - SECTION** 2

SITE: 4 Glide 3+57.8 Reach 4 Date: 4/27

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES / COMMENTS / REMARKS
1		4.24				
2	0+0.0			3.52		
3	0+3.9			4.28		
4	0+8.0			5.56		
5	0+10.0			5.88		
6	0+11.5			5.98		
7	0+12.1			6.02		
8	0+14.5			6.21		BKF
9	0+16.0			6.47		
10	0+17.1			6.46		
11	0+18.0			6.47		BKF?
12	0+18.7			6.65		
13	0+19.1			6.84		
14	0+19.6			7.17		
15	0+20.1			7.31		LEW
16	0+20.9 0+23.6			7.50 7.85		
17	0+25.0 0+27.9			7.86 7.88		
18	0+29.6 0+32.3			8.02 7.97		TL
19	0+33.5 0+35.4			7.92 7.93		
20	0+38.5 0+40.0			7.88 7.67		
21	0+40.6 0+41.1			7.60 7.32		REW
22	0+41.9 0+42.5			7.18 6.91		
23	0+43.1 0+43.5			6.71 6.51		BKF?
24	0+44.0 0+44.7			6.27 5.90		
25	0+46.0 0+46.5			4.97 4.71		RTB
26	0+48.6 0+51.0			4.60 4.79		
27	0+ 0+					
28	0+ 0+					
29						
30						
31						

Point bar slope

$\frac{1.3}{4.5}$

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Marsh Run - Reach 4 - 4/2/17

Riffle 3+63.4

BS: 4.24 (BM1)

0+0.0	3.94	
0+3.5	4.93	
0+5.9	5.80	
0+7.4	6.12	BKF?
0+8.7	6.46	BKF?
0+9.4	6.64	BKF?
0+12.2	6.75	BKF?
0+13.0	6.87	BKF?
0+14.0	6.93	
0+14.9	7.39	
0+16.2	7.37	LEW
0+18.3	7.76	
0+21.9	7.76	IB
0+23.4	7.91	
0+25.1	7.98	
0+26.2	8.02	
0+29.0	8.02	TL 27.6 8.01
0+30.0	8.01	
0+32.3	7.97	
0+34.5	7.83	
0+35.7	7.84	
0+37.1	7.40	REW
0+38.2	7.00	
0+38.9	6.73	
0+40.0	6.56	BKF?
0+41.0	6.06	BKF
0+42.4	5.29	
0+43.5	4.86	
0+45.0	4.66	RTB
0+50.0	4.93	
0+83.0	4.97	
0+08.0	3.67	
0+15.0	2.67	
0+20.0	2.09	

Run 3+71.1

0+00	5.69	
0+03.1	6.20	
0+04.4	6.64	
5.3	6.74	
6.4	6.59	BKF?
8.2	6.62	BKF?
9.2	6.71	BKF?
9.7	6.91	BKF?
10.5	7.31	
10.9	7.39	LEW
11.7	7.66	
12.6	7.95	
14.4	8.07	
16.5	7.98	
18.8	8.53	
21.0	8.59	TW
22.2	8.52	
23.9	8.21	
26.8	8.04	
27.9	8.00	
28.2	7.38	REW
28.5	7.2	
29.6	6.83	
31.6	6.71	
33.6	6.19	BKF?
34.7	5.44	
35.7	5.24	
37.1	4.99	RTOB
42.3	4.75	
50	5.02	

SURVEY DATA ⟹ **CROSS - SECTION 1**

SITE: Marsh Run Date: 4/27/17

Location: Reach 4 XS-1 Pool @ 218

Observers: Kari / Nikki HUC:

Point bar slope 5 ft nor vert 1.4 ft

Item	Distance, Point, or STATION ft	Back-Sight B S ft	Height of Instrument H I ft	Fore-Sight F S ft	Elevation ft	REMARKS / COMMENTS / NOTES
1	BM		4.80			
2	0		4.60			
3	2.4		4.78			Terrace
4	5.9		6.55			
5	10.2		6.38			
6	12.3		6.41			
7	13.8		6.51			?BF
8	14.5		6.63			
9	15.0		6.84			
10	16.1		7.55			
11	16.7		7.68			LEW
12	17.3		7.78			
13	18.2		7.96			
14	18.8		8.13			
15	19.4		8.36			
16	22.8		8.45			IB
17	24.9		8.83			
18	26.1		8.94			TW, wd = 1.42'
19	27.1		8.88			next to cinder block, on stream bed
20	28.1		8.13			on cinder block
21	28.9		7.64			RBB, cinder block
22	29.3		7.23			cinder wall
23	29.6		6.35			Bankfull - adjusted to here & used in long pro
24	30.6		5.96			on ground
25	31.6		5.53			RTB
26	33.0		5.28			on road
27	35.4		4.98			on road
28	42.0		4.27			on road, edge slope
	44.5		3.28			

Bench mark = 102.09

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Pool 25.2 bkf area
1.06 bkf to water surface - strong bench

Actively building floodplain

Glide xs area a bit low
.84 bkf to water surface - building a floodplain - low

F1

used to be a C

Riffle
.87 bkf to water surface xs area - 27.6 ER 1.23 v - 3.9 vel 2.1 use C1 Manning's n
1.44 if raised area - 41.3 2.6 1.8 C4/6/1

Run
1.98 bkf to ws

s e
33.49 100.5 - glide
25.06 100.45 - run

Pool - 44.5 xs area if raised
1.05, 1.25 if raised

Glide
.83, 1.1 if raised

Riffle .87 ER = 2.38
.89 no raising 32.3 xs area v = 3.3
1.28 if moved minutely down - bkf

xs area at gauge 38.5 b/c of backwater - lower velocity so it has lower xs area - so our reach slope will be higher
3.8 ft/s on 0.002 slope?

3.8/shear v

R/D84

Slope - 0.002
bkf slope 0.0019

D_{50} = 48

adjust bkf
5/10th s
w/d ratio 14-16
higher velocity
n = .035

SURVEY DATA → **CROSS - SECTION** 4

SITE: R4 XS-2 Glide @ 234 Marsh Run Date: 4/27/17

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES COMMENTS REMARKS
1	2.5		4.90			Terrace
2	5.0		5.78			
3	7.0		6.98			?BF
4	10.7		7.28			BF? / LB
5	12.0		7.41			
6	13.3		7.86			LEW/LBB
7	14.5		8.16			
8	16.1		8.28			
9	18.6		8.24			
10	20.2		8.02			
11	22.5		8.21			
12	24.4		8.02			
13	25.4		8.16			
14	26.7		8.30			TW, wd = 0.68'
15	27.2		7.89			before rock
16	27.3		7.77			on rock, out of water
17	28.4		7.17			
18	29.1		7.65			after rock
19	30.2		8.01			w/RBB
20	32.4		7.64			
21	33.6		6.23			BF?
22	35.0		5.28			RTB ahead
23	44.9		4.69			at slope start ahead
24	46.4		3.38			
25	Added:					
26	33.49		6.39			BKF adjusted
27						
28						
29						
30						
31						

Use

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SURVEY DATA → **CROSS - SECTION** 5

SITE: Reach 4 xs 3 Riffle at 239 Date: 4/27/17

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES / COMMENTS / REMARKS
1	4.680		4.68			top of
2	2.5		4.71			
3	3.4		4.8			top of slope
4	4.9		4.98			
5	6.0		5.5			
6	7.0		5.82			
7	9.1		7.19			inner bank
8	11.5		6.99			
9	12.2		6.91			top of berm
10	12.7		7.12			
11	8.0		6.08			above bkf
12	13.4		7.68			edge of water - ℄ EW
13	13.6		7.87			bottom of slope
14	14.8		7.87			
15	16.4		8.19			
16	20		8.21			
17	21		8.14			
18	21.3		8.02			top of rock
19	22.2		8.08			
20	22.6		7.96			
21	23.6		8.13			
22	24.7		8.10			
23	26.7		8.16			
24	28.2		8.36			thalweg 0.68'
25	29.9		8.25			
26	31		8.26			
27	32.1		8.10			bottom of bank
28	32.8		7.10			
29	33.5		6.78			bkf?
30	34		6.24			BKF
31	35.1		5.84			

out of order

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over →

station	HI	
36	5.18	top of bank
44.5	4.67	top of valley
49	3.12	

SURVEY DATA ⟹ **CROSS - SECTION** 6

SITE: Marsh Run Reach 4 Run xs-4 @ 260 **Date:** 4/27/17

Item	STATION ft	B S ft	H I ft	F S ft	Elevation ft	NOTES / COMMENTS / REMARKS
1	0		4.6			top of bank
2	2.5		7.0			toe of slope
3	5		7.55			too low for bkf
4	6.5		7.84			left edge of water
5	8		8.07			
6	8.9		8.24			
7	11		8.5			soft bottom
8	13.5		8.93			
9	15.8		9.30			thalweg 1.49'
10	19.8		8.67			
11	21		8.6			before rock
12	21.6		8.08			top of rock
13	22.3		8.35			stream bed
14	23		8.26			toe of slope
15	23.3		7.32			
16	23.6		7.2			
17	24.3		6.88			?bkf
18	25.4		6.18			
19	27		5.54			
20	30		5.12			
21	40.2		4.79			
22	43.5		4.13			
23	Added:					
24	25.06		6.44			Bankfull adjusted
25						
26						
27						
28						
29						
30						
31						

offset because of thick veg

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SURVEY DATA → **LONGITUDINAL PROFILE 2**

SITE: Marsh Run Date: 4/27/17

Location: Reach 4

Observers: HUC:

	Distance, Point, or STATION ft	Back-Sight BS ft	Height of Instrument HI ft	Thalweg Fore-Sight FS ft	Thalweg Elevation Elev. ft	Water Surface Fore-Sight FS ft	Water Surface Elevation Elev. ft	Bankfull Fore-Sight FS ft	Bankfull Elevation Elev. ft	Low Bank HI Fore-Sight FS ft	Low Bank HI Elevation Elev. ft	NOTES e.g. Riffle Run Pool Glide
28	2+02.2			9.46		1.20	Depth					
29	BM#2	@ 2+18		5.51								
30	2+18.0			9.7		1.42		7.26				Pool x-section BKf good
31	2+20.1			9.64		1.38						Glide
32	2+31.0			9.08		0.78						Glide x-section
33	2+38.4			8.86		0.42						riffle
34	2+43.0			9.36		1.0						
35	2+53.0			9.74		1.18						Run
36	2+68.8			10.51		1.94		7.69				End of Run BKf good
37	2+72.3			10.49		1.92	DEPTH					POOL
38	2+85.0			10.5		1.96	DEPTH					POOL
39	2+93.4			9.90		1.34	DEPTH					
40	2+87			~~10.25~~	10.25	1.66		7.66				
41	3+06.0			10.13		1.6						POOL
42	3+20.5			9.73		1.2						POOL
43	3+28.0			9.64		1.0						POOL | START OF GLIDE
44	3+36.0			9.33		0.76						GLIDE
45	3+57.8			9.41		8.64	ROD	7.78				GLIDE X-SECTION
46												
47	3+63.4			9.31		0.62	DEPTH	7.77				MID RIFFLE X-SECTION
48	3+66.0			9.62		0.94	DEPTH					~~RUN~~ Riffle/Run
49	3+71.1			9.88		1.20	DEPTH	7.85	— backwater			mid Run X SECTION
50	3+75.4			10.05		1.40	DEPTH					end run
51	3+81.0			10.10		1.44	DEPTH					POOL
52	3+86.5			10.25		1.62	DEPTH					POOL
53	3+90.0			10.10		1.44	DEPTH					POOL
54	3+95			10.39		1.74						

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mid	Riffle	3+63.4
mid	Run	3+71.1
top	Glide	3+57.8

SURVEY DATA → **LONGITUDINAL PROFILE 1**

SITE: Marsh Run Date: 4/27/17

Location: Reach 4 BM=100 @ STA 0+45.4

Observers: HUC:

	Distance, Point, or STATION ft	Back-Sight BS ft	Height of Instru-ment HI ft	Thalweg Fore-Sight FS ft	Thalweg Elevation Elev. ft	Water Surface Fore-Sight FS ft	Water Surface Elevation Elev. ft	Bankfull Fore-Sight FS ft	Bankfull Elevation Elev. ft	Low Bank Hl Fore-Sight FS ft	Low Bank Hl Elevation Elev. ft	NOTES e.g. Riffle Run Pool Glide
1												
2	BM	7.60	107.60									
3	0+50.2			8.91		0.70	DEPTH					END OF STEP
4	0+54.4			9.40		0.90	DEPTH					RUN
5	0+64.9			9.26		1.08	DEPTH	7.30				GOOD BKF / RUN
6	0+60.9			9.12		0.99	DEPTH					RUN
7	0+66.5			9.25		1.09	DEPTH					POOL
8	0+69.2			9.51		1.34	DEPTH					POOL
9	0+73.9			11.30		1.20	DEPTH					POOL
10	0+81.5			11.59		1.48	DEPTH					POOL
11	0+87.7			9.51		1.34	DEPTH					POOL
12	0+93.5			9.38		1.18	DEPTH					
13	0+98.9			9.26		1.06	DEPTH					
14	1+09.6			8.84		0.64	DEPTH					GLIDE
15	1+10.1			9.68		1.30	DEPTH					
16	1+12.7			9.49		1.28	DEPTH	7.28				BKF - GOOD?
17	1+16.0			9.31		1.18	DEPTH					
18	1+17.0			9.74		1.52	DEPTH					
19	1+21.5			9.45		1.24						
20	1+37.0			9.40		1.20						
21	1+45.5			9.16		0.94		7.34	6.96			
22	1+48.7			9.34		1.14						POOL
23	1+61.9			9.63		1.40						POOL MAX DEPTH
24	1+69.2			9.44		1.2						
25	1+32.9			9.66		8.21	ROD	7.31				
26	1+74.0			9.27		1.05						
27	1+90.3			9.23		0.99						

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SURVEY DATA → **LONGITUDINAL PROFILE 4**

SITE: Marsh Run Date: 4/27/17

Location: Reach 4

Observers: HUC:

	Distance, Point, or STATION (ft)	Back-Sight BS (ft)	Height of Instrument HI (ft)	Thalweg Fore-Sight FS (ft)	Thalweg Elevation Elev. (ft)	Water Surface Fore-Sight FS (ft)	Water Surface Elevation Elev. (ft)	Bankfull Fore-Sight FS (ft)	Bankfull Elevation Elev. (ft)	Low Bank HI Fore-Sight FS (ft)	Low Bank HI Elevation Elev. (ft)	NOTES e.g. Riffle Run Pool Glide
82	~~0+74~~			~~9.[illegible]~~		~~1.[illegible]~~	~~DEPTH~~					
83	~~0+98~~											
84	0+73			9.46		1.27	DEPTH					
85	0+865			9.86		1.65	DEPTH					
86	~~[illegible]~~											
87	1+12			9.49		1.28	DEPTH					
88												
89	54.4			9.24		1.05	DEPTH					
90	109.6			9.10		0.90	DEPTH					
91												
92	3+41			9.69		1.1	DEPTH					
93	3+47			9.62		1.03	DEPTH					
94	3+50			9.58		0.98	DEPTH					
95	3+57			9.38		0.79	DEPTH					
96	3+63			9.37		0.76	DEPTH					
97	3+68			9.71		1.08	DEPTH					
98												
99	3+60			9.34		0.74	DEPTH					
100												
101												
102												
103												
104												
105												
106												
107												
108												

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SURVEY DATA → LONGITUDINAL PROFILE 3

9.16
.6

SITE: Marsh Run Date: 4/27/17

Location: Reach 4

Observers: HUC:

	Distance, Point, or STATION ft	Back-Sight BS ft	Height of Instrument HI ft	Thalweg Fore-Sight FS ft	Thalweg Elevation Elev. ft	Water Surface Fore-Sight FS ft	Water Surface Elevation Elev. ft	Bankfull Fore-Sight FS ft	Bankfull Elevation Elev. ft	Low Bank HI Fore-Sight FS ft	Low Bank HI Elevation Elev. ft	NOTES e.g. Riffle Run Pool Glide
55												
56	1+28			9.72		1.48	DEPTH					Pool
57	1+55.5			9.60		1.37						Pool
58	1+85			9.70		1.44						
59	2+10			9.40		1.12						
60	2+25			9.47		1.17						
61	2+47.5			9.35		.85						
62	2+61			10.14		1.6						
63	2+84.5			10.55		2.02						
64	3+00.2			10.05		1.49						Pool
65	3+09.4			10.01		1.45						
66	3+43			9.58		1.02						
67												
68	2+34			9.02		.68						Glide XS
69	2+39			9.13		.70						Riffle XS
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												
81												

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Site: MARSH'S RUN

Location: REACH #4 HUC:

Observers: TEAM #4

PEBBLE COUNT — PROTRUSIONS

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	~~POOL~~ 2	COMP. 3	RIFFLE (1) TOT #	RIFFLE (1) ITEM %	RIFFLE (1) % CUM	~~POOL~~ (2) PROTRUSIONS TOT #	~~POOL~~ (2) PROTRUSIONS ITEM %	~~POOL~~ (2) PROTRUSIONS % CUM	COMPOSITE (3) TOT #	COMPOSITE (3) ITEM %	COMPOSITE (3) % CUM
				Reach: #4			Reach: #4			Reach:					
				Date: 4-27-17			Date: 4-27-17			Date:					
	Silt / Clay	< .062	S/C	⊠ ·			11			—					
	Very Fine	.062 - .125	SAND	∷			3			—					
	Fine	.125 - .25		∷			6			—					
	Medium	.25 - .50		∷			3			—					
	Coarse	.50 - 1.0					—			—					
.04 - .08	Very Coarse	1.0 - 2		∷			5			—					
.08 - .16	Very Fine	2 - 4	GRAVEL	⊠			9			—					
.16 - .22	Fine	4 - 5.7		∷			4			—					
.22 - .31	Fine	5.7 - 8		∷			2			—					
.31 - .44	Medium	8 - 11.3		∷			4			—					
.44 - .63	Medium	11.3 - 16		∷			3			—					
.63 - .89	Coarse	16 - 22.6		∷	∷		5			7					
.89 - 1.3	Coarse	22.6 - 32		∷	∷		2			8					
1.3 - 1.8	Very Coarse	32 - 45		·	⊠ ⊠ ·		1			21					
1.8 - 2.5	Very Coarse	45 - 64		·	⊠ ⊠ ·		1			21					
2.5 - 3.5	Small	64 - 90	COBBLE	∷	⊠ ⊠ ∷		5			22					
3.5 - 5.0	Small	90 - 128		⊠	⊠ ∷		10			15					
5.0 - 7.1	Large	128 - 180		∷	∷		6			4					
7.1 - 10.1	Large	180 - 256		∷	·		2			1					
10.1 - 14.3	Small	256 - 362	BOULDER	∷	·		5			1					
14.3 - 20	Small	362 - 512		·			1			—					
20 - 40	Medium	512 - 1024					—			—					
40 - 80	Large-Vry Large	1024 - 2048					—			—					
	Bedrock		BDRK	⊠ ∷			12			—					
Stream Type:			**Landscape Type:**			TOTAL→	100			100					

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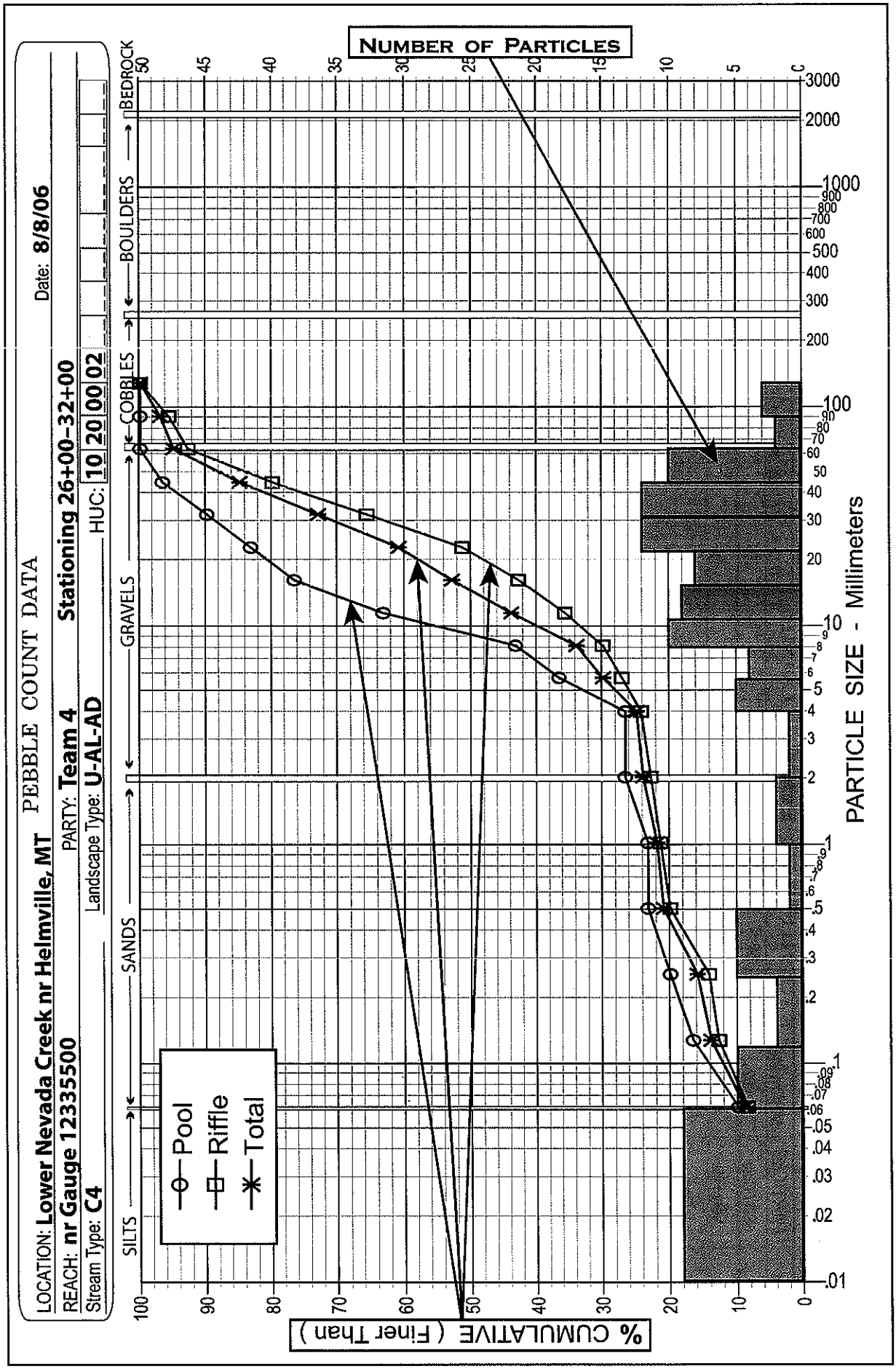

Figure B-22. Pebble count plot with example data.

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Site: MARSH'S RUN

Location: REACH 4 HUC:

Observers: TEAM 4

Dot Count for RIFFLE ~~POOL~~ COMP.

RIFFLE PEBBLE COUNT — RIFFLE PROTRUSION

Inches	PARTICLE	Millimeters		RIFFLE (1) TOT #	RIFFLE (1) ITEM %	RIFFLE (1) % CUM	~~POOL~~ (2) TOT #	~~POOL~~ (2) ITEM %	~~POOL~~ (2) % CUM	COMPOSITE (3) TOT #	COMPOSITE (3) ITEM %	COMPOSITE (3) % CUM
				PEBBLE RIFFLE STA			PROTRUSION RIFFLE STA					
				Reach: #4			Reach: #4			Reach:		
				Date: 4-27-17			Date: 4-27-17			Date:		
	Silt / Clay	< .062	S/C	5			—					
	Very Fine	.062 - .125	SAND	5			—					
	Fine	.125 - .25	SAND	—			—					
	Medium	.25 - .50	SAND	4			—					
	Coarse	.50 - 1.0	SAND	3			—					
.04 - .08	Very Coarse	1.0 - 2	SAND	6			—					
.08 - .16	Very Fine	2 - 4	GRAVEL	2			—					
.16 - .22	Fine	4 - 5.7	GRAVEL	2			1					
.22 - .31	Fine	5.7 - 8	GRAVEL	2			2					
.31 - .44	Medium	8 - 11.3	GRAVEL	4			—					
.44 - .63	Medium	11.3 - 16	GRAVEL	9			7					
.63 - .89	Coarse	16 - 22.6	GRAVEL	7			8					
.89 - 1.3	Coarse	22.6 - 32	GRAVEL	3			9					
1.3 - 1.8	Very Coarse	32 - 45	GRAVEL	4			20					
1.8 - 2.5	Very Coarse	45 - 64	GRAVEL	4			19					
2.5 - 3.5	Small	64 - 90	COBBLE	1			12					
3.5 - 5.0	Small	90 - 128	COBBLE	4			13					
5.0 - 7.1	Large	128 - 180	COBBLE	3			5					
7.1 - 10.1	Large	180 - 256	COBBLE	1			2					
10.1 - 14.3	Small	256 - 362	BOULDER	1			1					
14.3 - 20	Small	362 - 512	BOULDER	—			1					
20 - 40	Medium	512 - 1024	BOULDER	—			—					
40 - 80	Large-Vry Large	1024 - 2048	BOULDER	—			—					
	Bedrock		BDRK	30			—					
			TOTAL→	100			100					

Stream Type: **Landscape Type:**

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Site: MARSH'S RUN

Location: REACH 4 HUC: _____

Observers: TEAM 4

Inches	PARTICLE	Millimeters		Dot Count for RIFFLE 1	POOL 2	COMP. 3	RIFFLE (1) TOT #	ITEM %	% CUM	POOL (2) TOT #	ITEM %	% CUM	COMPOSITE (3) TOT #	ITEM %	% CUM
							Reach: #4			Reach: #4			Reach: #4		
							Date: 4-27-17			Date: 4-27-17			Date: 4-27-17		
	Silt / Clay	< .062	S/C	•	⊠ ⊡		1			18			19		
	Very Fine	.062 - .125	SAND	•	⊠		2			10			12		
	Fine	.125 - .25	SAND	•	⊠		2			9			11		
	Medium	.25 - .50	SAND	••	••		4			3			7		
	Coarse	.50 - 1.0	SAND	••	••		5			4			9		
.04 - .08	Very Coarse	1.0 - 2	SAND	••	•		3			2			5		
.08 - .16	Very Fine	2 - 4	GRAVEL				—			—			—		
.16 - .22	Fine	4 - 5.7	GRAVEL	•			1			—			1		
.22 - .31	Fine	5.7 - 8	GRAVEL		•		—			1			1		
.31 - .44	Medium	8 - 11.3	GRAVEL				—			—			—		
.44 - .63	Medium	11.3 - 16	GRAVEL	•			1			—			1		
.63 - .89	Coarse	16 - 22.6	GRAVEL	•	•		2			1			3		
.89 - 1.3	Coarse	22.6 - 32	GRAVEL				—			—			—		
1.3 - 1.8	Very Coarse	32 - 45	GRAVEL	•			1			—			1		
1.8 - 2.5	Very Coarse	45 - 64	GRAVEL		•		—			1			1		
2.5 - 3.5	Small	64 - 90	COBBLE	•			2			—			2		
3.5 - 5.0	Small	90 - 128	COBBLE	••			3			—			3		
5.0 - 7.1	Large	128 - 180	COBBLE	••	•		3			1			4		
7.1 - 10.1	Large	180 - 256	COBBLE				—			—			—		
10.1 - 14.3	Small	256 - 362	BOULDER				—			—			—		
14.3 - 20	Small	362 - 512	BOULDER				—			—			—		
20 - 40	Medium	512 - 1024	BOULDER				—			—			—		
40 - 80	Large-Vry Large	1024 - 2048	BOULDER				—			—			—		
	Bedrock		BDRK	⊠	⊠		10			10			20		
Stream Type:			**Landscape Type:**			TOTAL→	40			60			100		

65

74

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	Min	Avg	Max
S Riffle	0.01332	0.01530	0.01727
S pool	0.00079	0.00120	0.00179
S Run	0.03432	0.04404	0.05393
S glide	0.01776	0.02554	0.03331

pool length 2

		Avg length
160.6	69.4 – 230	129.3
98	254 – 352	
147 – 273		126 space Avg
273 – 390		117
pool length	47.56	121.5
	119.87	
	107.67	

pool to pool

128.33	45.79
82.54	31.66
159.99	58.68
218.07	61.47
279.54	116.17
395.71	
	62.75

Riffle 4.58 0.021
5.67 0.13
5.125

	STA	Water		water slope
glide slope	231 – 234	99.3 – 99.26		0.0133 ✓
	357 – 360	99.01	98.99	0.0067 ✓
riffle	234 – 239	99.26	~~98.47~~ 99.17	0.018 ✓
run	360 – 368	98.99	98.95	0.0067 ✓
	239 253	99.17	99.04	0.0325 ✓
	368 371.1	98.95	98.92	0.0059 ✓

	pool		A
60.9	STA 60.9 109.6	99.41 – 99.4	
47.7	120.5 169.2	99.38 – 99.36	
40.7	190.3 – 231	99.36 – 99.3	
83	253 – 336	99.04 – 99.01	
21	336 – 357	99.01 99.01	

pool

62.75	31.66	116.17
91.7	47.56	119.87
5.13	4.58	5.67

0.000164
0.000419
0.00147
0.000361

Avg pool sl.
0.00060

Dmax Riffle 0.66 0.75
pool
Run
Glide

Unconfined – alluv – floodpl – terrace

Worksheet B-4. Dimensionless ratios of the ten pool types (*Second Field Day*).

Stream:		Location:						
Observers:		Stream Type:		Landscape Type:		Date:		
		Dimensional Values				**Dimensionless Ratios**		
Pool Type		***Pool Length*** (L_p)	***Pool Max Depth*** (d_{maxp})	***Pool Slope*** (S_p)		***Pool Length to Riffle Width*** (L_p / W_{bkf})	***Pool Max Depth to Riffle Mean Depth*** (d_{maxp} / d_{bkf})	***Pool Slope to Average Slope*** (S_p / S)
1. Lateral Scour Pool (LSP)	***Mean***				***Mean***			
	Min.				***Min.***			
	Max.				***Max.***			
2. Contraction Scour Pool (CSP)	***Mean***				***Mean***			
	Min.				***Min.***			
	Max.				***Max.***			
3. Step/Pool (SP)	***Mean***				***Mean***			
	Min.				***Min.***			
	Max.				***Max.***			
4. Backwater Pool (BWP)	***Mean***				***Mean***			
	Min.				***Min.***			
	Max.				***Max.***			
5. Plunge Pool (PP)	***Mean***				***Mean***			
	Min.				***Min.***			
	Max.				***Max.***			
6. Pocket Water Pool (PWP)	***Mean***				***Mean***			
	Min.				***Min.***			
	Max.				***Max.***			
7. Lateral Protrusion Pool (LPP)	***Mean***				***Mean***			
	Min.				***Min.***			
	Max.				***Max.***			
8. Straight Dissipator Pool (SDP)	***Mean***				***Mean***			
	Min.				***Min.***			
	Max.				***Max.***			
9. Converging Confluence Pool (CCP)	***Mean***				***Mean***			
	Min.				***Min.***			
	Max.				***Max.***			
10. Compound Pool (CP)	***Mean***				***Mean***			
	Min.				***Min.***			
	Max.				***Max.***			

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Marsh Run - Reach 4

4/27/17

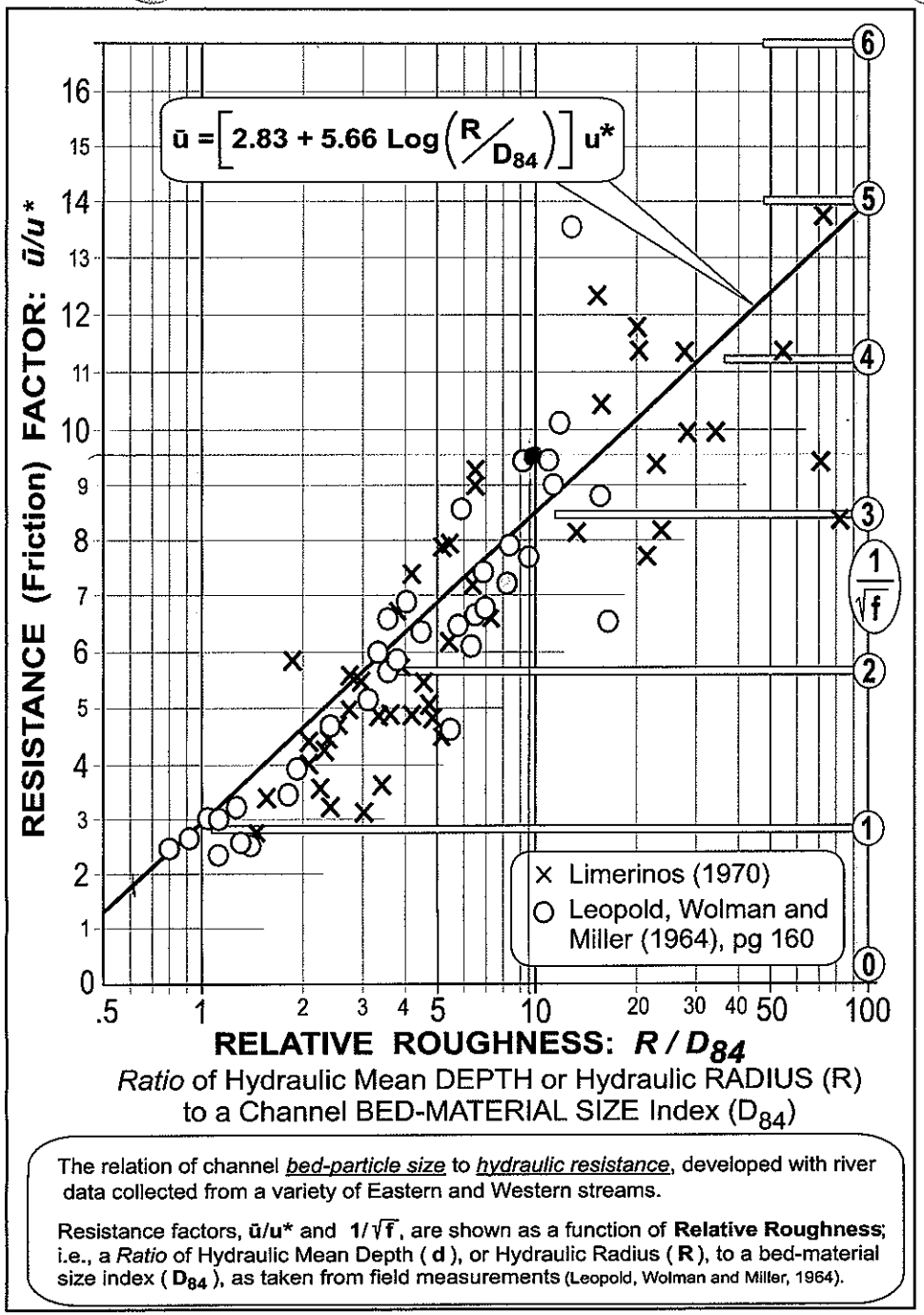

Figure B-34. Relative roughness (R/D_{84}) *vs.* friction factor ($\bar{u}/u^*$).

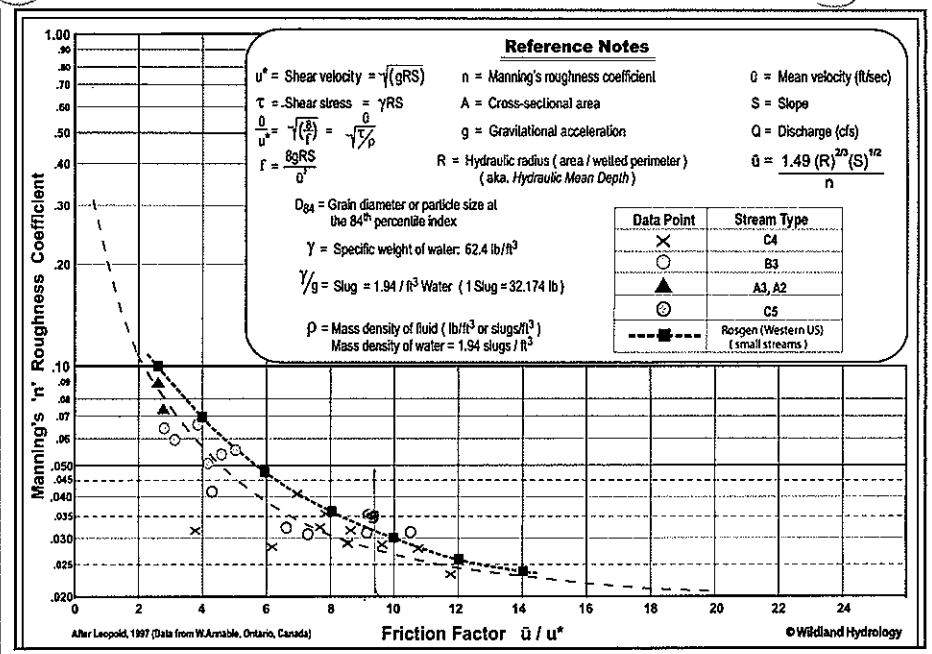

Figure B-35. Friction factor ($\bar{u}/u^*$) *vs.* Manning's roughness coefficient 'n'.

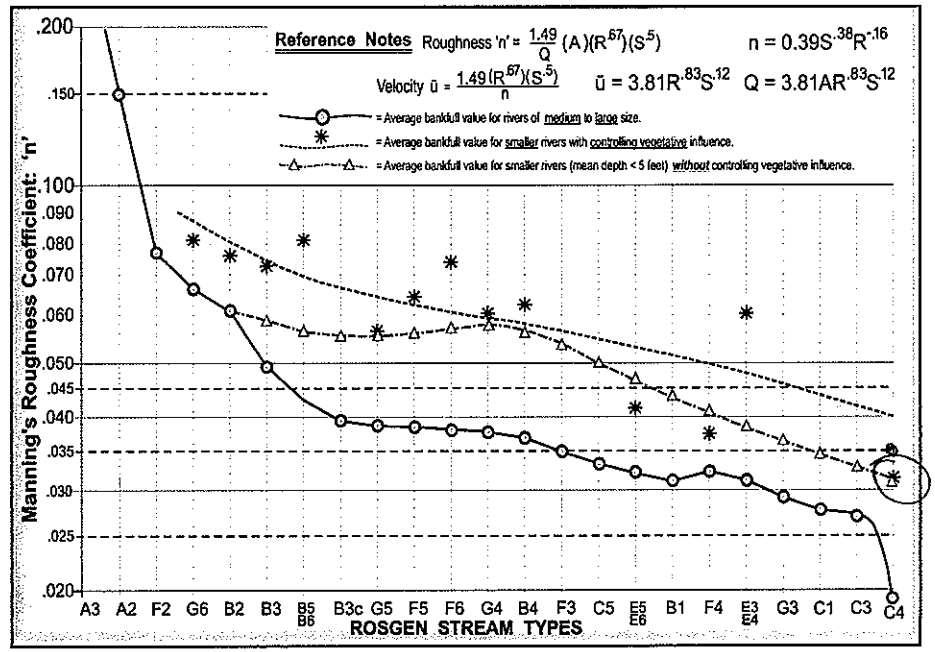

Figure B-36. Manning's 'n' roughness coefficient by stream type.

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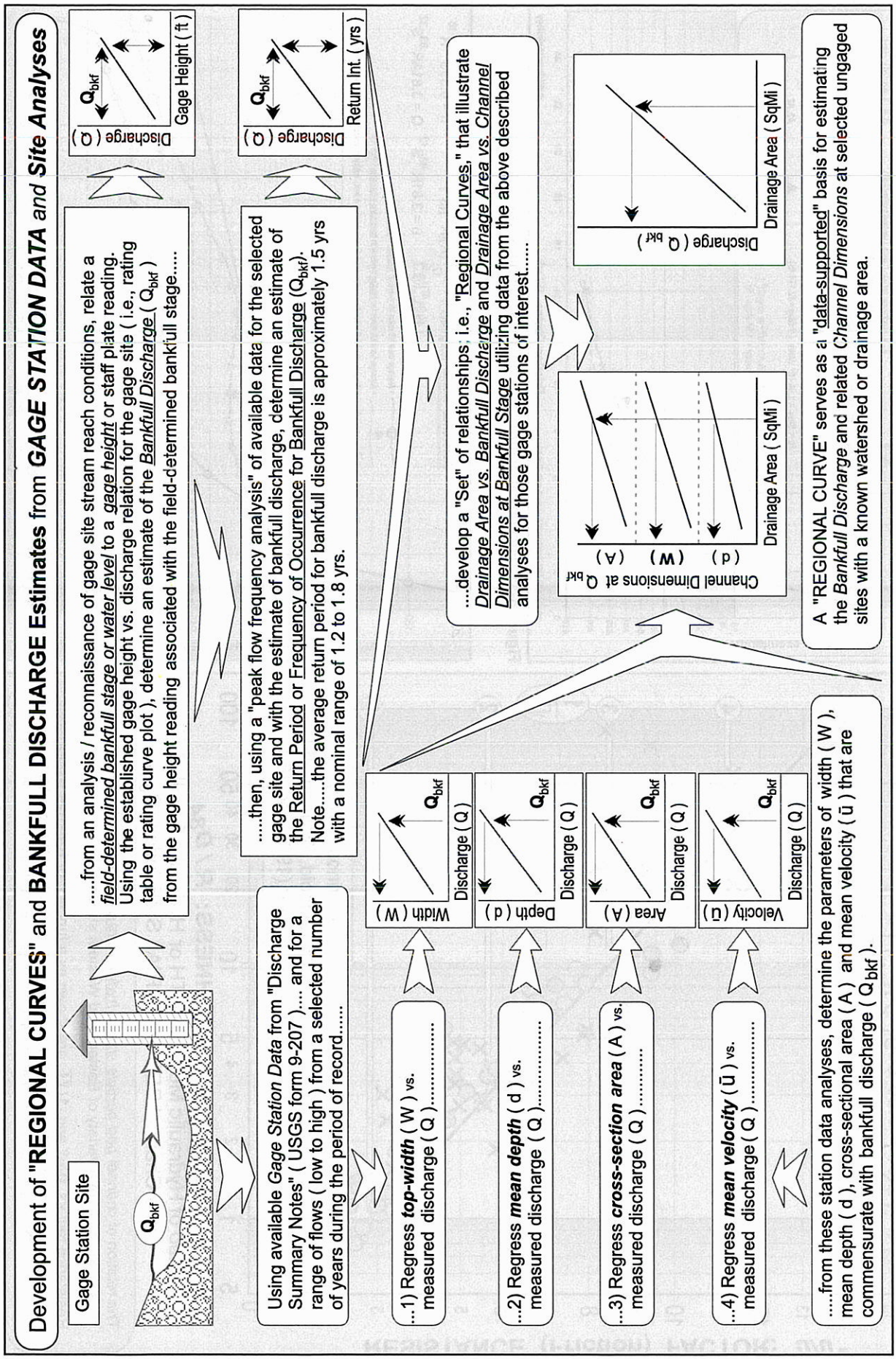

Figure B-42. Development of regional curves and bankfull discharge estimates from gage station data and site analyses.

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Marsh Run - Reach 4 - 4/27/17

Worksheet B-5. Procedure to validate hydraulic relations using gage station data.

Validation of Hydraulic Relationships Using Gage Station Data

1. Obtain the drainage area associated with the gaging station.
2. Obtain the field-determined bankfull discharge at the gaging station (**Figure B-43**).
3. Obtain the bankfull channel dimensions from the gaging station hydraulic geometry relationships (discharge *vs.* width, depth, area, and velocity).
4. Measure the average water surface slope.
5. Perform an active bed pebble count on the riffle to obtain D_{84}.
6. Determine the stream type.
7. Solve for Manning's 'n' at the bankfull stage: $n = (1.49R^{2/3}S^{1/2})/\bar{u}$ (use the bankfull mean velocity from Step 3).
8. Calculate relative roughness: R/D_{84}. Make sure that D_{84} is converted from millimeters to feet. Hydraulic radius (R) and mean depth (d_{bkf}) are often used interchangeably when width/depth ratios are greater than 12.
9. Calculate shear velocity: $u^* = (gRS)^{1/2}$.
10. Calculate friction factor: $\bar{u}/u^*$.
11. Plot bankfull discharge as a function of drainage area on the appropriate regional curve.
12. Plot bankfull channel dimensions as a function of drainage area on the appropriate regional curve (note stream type of plotted values using unique symbols).
13. Plot relative roughness by friction factor (**Figure B-34**) (Example in **Figure B-39**).
14. Plot Manning's 'n' by friction factor (**Figure B-35**) (Example in **Figure B-40**).
15. Plot Manning's 'n' by stream type (**Figure B-36**) (Example in **Figure B-41**).

Gaging Station Name: **Gaging Station Number:** 01

1	2	3a	3b	3c	3d	4	5a	5b	6	7	8	9	10
Drainage Area (mi²)	Bankfull Discharge Q_{bkf} (cfs)	Bankfull Width W_{bkf}	Bankfull Mean Depth d_{bkf} (ft)	Bankfull Area A_{bkf} (ft²)	Bankfull Velocity $\bar{u}_{bkf}$ (ft/s)	Ave. Water Surface Slope S (ft/ft)	D_{84} (mm)	D_{84} (ft)	Stream Type	Manning's 'n'	Relative Roughness R/D_{84} (ft/ft)	Shear Velocity u* (ft/s)	Friction Factor $\bar{u}/u^*$
189	109	20	1.9	38	2.87	0.0021	48	0.16	C4/A	0.035	9.55	0.303	9.47

GAGE DATA | FIELD DATA | COMBO

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Summary....*USGS GAGE STATION* Data / Records for STREAM CHANNEL CLASSIFICATION

Station NAME:	MARSH RUN AT GRIMES	Station Number:	01617800
LOCATION:	REACH #4		
Period of Record:	53 yrs	Mean Annual DISCHARGE:	cfs
Drainage AREA:	acres / mi²	Drainage Area Mn Elev:	ft
Reference REACH SLOPE:	ft/ft	Valley Type:	
Stream Type:		HUC:	

"BANKFULL" CHARACTERISTICS

Determined from FIELD MEASUREMENT			Determined from GAGE DATA Analysis		
Bankfull WIDTH (W_{bkf})	25.8	ft	Bankfull WIDTH (W_{bkf})	20	ft
Bankfull Mean DEPTH (d_{bkf})	1.6	ft	Bankfull MEAN DEPTH (d_{bkf})	1.9	ft
Bankfull Xsec AREA (A_{bkf})	41.3	ft²	Bankfull Xsec AREA (A_{bkf})	38	ft²
Wetted PERIMETER (W_P)	27.5	ft	Wetted PERIMETER (W_P)	23.8	ft
Bankfull STAGE (Gage Ht)	2.12	ft	Bankfull STAGE (Gage Ht)	2.15	ft
Est. Mean VELOCITY (u)	2.54	ft/sec	Mean VELOCITY (u)	2.87	ft/sec
Est. Bkf. DISCHARGE (Q_{bkf})	104.84	cfs	Bankfull DISCHARGE (Q_{bkf})	109	cfs

Bankfull DISCHARGE associated with **"field-determined"** Bankfull STAGE (From Gage Height reading at Staff Plate and tabular Stage-Discharge curve data)	106	cfs
Recurrence Interval (Log-Pearson) associated with **"field-determined"** Bankfull Discharge	2.1	yrs

From the *Annual Peak Flow Frequency Analysis* data for the Gage Station, determine:

1.5 Year **R.I.** Discharge =	72	cfs	**10** Year **R.I.** Discharge =	264	cfs
2.0 Year **R.I.** Discharge =	103	cfs	**25** Year **R.I.** Discharge =	372	cfs
5.0 Year **R.I.** Discharge =	197	cfs	**50** Year **R.I.** Discharge =	465	cfs

MEANDER GEOMETRY

Meander Wavelength (L_m)	108..	ft	Radius of Curvature (R_C)	44.08	ft
Belt Width (W_{blt})	31.7	ft	Meander Width Ratio (W_{blt}/W_{bkf})	1.22	ft/ft

HYDRAULIC GEOMETRY

Based on *USGS Discharge Summary Notes* data (Form 9-207) and regression analyses of measured discharge (**Q**) with the hydraulic parameters of Width (**W**), Area (**A**), Mean Depth (**d**) & Mean Velocity (**u**), determine the *intercept coefficient* (**a**) and the *slope exponent* (**b**) values for a power function of the form $Y = aX^b$, when **Y** is one of the selected hydraulic parameters and **X** is a given discharge value (**Q**).

	Width (W)	Depth (d)	Area (A)	Velocity(u)
Intercept Coefficient **a**)	11.242	0.3878	4.5328	0.2202
Slope Exponent **b**)	0.1583	0.3303	0.458	0.5573

Hydraulic Radius R = A / W_P	1.50	ft	**Manning's "n"** at Bankfull Stage	.035	Coeff.

"n" = 1.4895 **[(A**rea) (Hydraulic **R**adius$^{2/3}$) (**S**lope)$^{1/2}$**]** / Q_{bkf}

BAD BRACKETS

Bkf's Riffle
Depths - Run

Check ratios

Flat bottom loses 28% of sediment transport capacity

Watch pool for level III

human tendency to take lowest bench as bankful

only one
X Stream meanderlength ratio

19.15 sq mi drainage ratio

pool to pool spacing: 1/2 of meander λ
LATERAL SCOUR POOLS

pattern & lateral scour pool data

pools - energy dissipation flow energy like a skier dropping into the knees to carve a turn

problem: in curvature but trying to build depositional surface

~~bankfull ratio~~

X Check sinuosity vs. linear λ / meander λ stream meanderlength

X Check max glide depth vs. what's in XS

glides & pools should have same slope

X glide slope to ave water slope

X .8 pool slope: Avg water max doesn't make sense

X 1.5 glide slope: Avg water max doesn't make sense

1.3-1.4 max depth

XS data for riffles shows max depth for bxf diff than summary sheet

X make sure max depths in summary agree in XS.

glide depth → deeper

practice

(?) Figure B - 3

use D-50 if so on that

- check data in the field

Before start putting eggs in a basket check bkf call against velocity discharge, regional curves -

Check in field before proceed w. bkf call.

if there's no way velocities work to get Q with slope, then have a chance to look for more features